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An Enumeration of the Plants collected by Dr. H. H. Rusby in South America, 1885-1886.—XIX.

(Continued from vol. xviii, page 334.)

EUPATORIUM THYMIFOLIUM, spec. nov. § Praxelis. Suffruticosum, ramosum, 7-8 dm. altum; ramis gracilibus, ascendentibus minute pubescentibus; foliis ovatis ovalibusque, integris, obtusis, supra scabris, intense viridibus, subtus punctatis, pubescentibus, 8-15 mm. longis, 3-6 mm. latis, breviter petiolatis; capitulis gracile pedicellatis, campanulatis, 1 cm. longis; involucri squamis 2-3-seriatis, obtusis, minute pubescentibus, interioribus linearibus, exterioribus brevioribus, lanceolatis, pappi setis griseis, flexuosis; acheniis linearibus, infra attenuatis.

Ingenio del Oro, 10,000 ft. (1747). Related to *E. erythrolepis*, Sch. Bip. based on Mandon's 261.

Eupatorium dendroides, Spreng. Syst. Veg. iii. 466. Yungas, 4,000 ft. (1580).

Mikania scandens (L.), Willd. Sp. Pl. iii. 1743. Yungas, 6,000 ft. (1645); Guanai, 2,000 ft. (1644); Mapiri, 5,000 ft. (1647). Junction of the rivers Beni and Madre de Dios (1646).

Mikania cordifolia (L.), Willd. Sp. Pl. iii. 1746 (*M. gonoclada*, DC.). Near La Paz, 10,000 ft. (1648); Guanai, 2,000 ft. (1649).

Mikania psilostachya, DC. Prodr. v. 190. Yungas, 6,000 ft. (1702); Mapiri, 2,500 ft. (1701; 1703).

Mikania Lindbergii, Baker, in Mart. Fl. Bras. vi. Pars. ii. 233. Yungas, 6,000 ft. (1736).

Mikania angularis, Humb. & Bonpl. Pl. Æquinoc. ii. 87, t. 106. Yungas, 4,000 ft. (1740).

Mikania Hookeriana, DC. Prod. v. 195. Mapiri, 5,000 ft. (1738). The same as Matthew's No. 1368 from Peru.

Mikania amara (Vahl.), Willd. var. *Guaco* (Humb. & Bonpl.), Baker in Mart. Fl. Bras. vi. Pars. II. 237. Junction of the rivers Beni and Madre de Dios (1650). The same as Lechler's No. 2477 from Peru.

Mikania rufa, Benth. Pl. Hartw. 201. Unduavi, 8,000 ft. (1737).

Grindelia glutinosa (Willd.), Dunal. Mem. Mus. Par. v. 49. Tacna, Chili (1612).

Solidago polyglossa, DC. Prodr. v. 332. Yungas, 6,000 ft. (1629).

Læstadia Lechleri, Wedd. Chlor. And. i. 184. (*Lagenophora Lechleri*, Sch. Bip. Bonplandia, 1856, 54, name only). Unduavi, 8,000 ft. (2667).

Aster marginatus, H.B.K. Nov. Gen. iv. 91. Sorata, 10,000 ft. (1659).

Aster marginatus, var. *acaulis*, Sch. Bip. Bull. Soc. Bot. France, xii. 81, name only. Sorata, 13,000 ft. (1718).

Aster divaricatus, T. & G., var. *graminifolius* (Spreng.), Baker in Mart. Fl. Bras. vi. Pars. III, 22 (*A. exilis*, Ell. var. *australis*, A. Gray). Near La Paz, 10,000 ft. (1712). Among the numerous names which have been applied to this plant I am unable to ascertain definitely which is the oldest available one. I am following Mr. Baker in the name I here adopt, but am of the opinion that the plant is specifically distinct from the North American.

Aster Vahlii (Gaud.) H. & A. Comp. Bot. Mag. ii. 49. Sorata, 10,000 ft. ? (2720). Slightly different from the Patagonian specimens. Locality and determination uncertain.

Diplostephium Mandoni, Sch. Bip. Bull. Soc. Bot. France, xii. 81, name only. Unduavi, 8,000 ft. (1660).

Erigeron Pazensis, Sch. Bip. Bull. Soc. Bot. France, xii, 80, name only. Near La Paz, 10,000 ft. (1662; 1663).

Erigeron lanceolatum, Wedd. Chlor. And. i. 193, ex. descr. Yungas, 6,000 ft. Sorata, 8,000 ft. (1661).

Erigeron linifolium, Willd. Sp. Pl. iii. 1955. Near Valparaiso, Chili (2722).

Erigeron Canadense, L. Sp. Pl. 1211. (?) Near La Paz, 10,000 ft. (1666).

Erigeron Bonariense, L. Sp. Pl. 1211. Junction of the Rivers Beni and Madre de Dios (1664). Unduavi, 8,000 ft. (1665).

Erigeron floribundus (H.B.K.), Sch. Bip. Bull. Soc. Bot. France, xii. 81. Sorata, 10,000 ft. (2713). The same as Mandon's 218, Herb. Kew.

Erigeron spiculosum, H. & A. Bot. Beechey, 32. Near Valparaiso, Chili (1667).

Erigeron hieracioides, Wedd. Chlor. And. i. 194. Sorata, 10,000 ft. (2717); 13,000 ft. (2716).

Erigeron rosulatum, Wedd. Chlor. And. 193. Sorata, 13,000 ft. (1616). Possibly distinct, as Dr. Rusby's specimens are more silvery pubescent than Mandon's 224, so named by Schultz.

Conyza Chilensis, Spreng. Nov. Prov. 14. Near Valparaiso (2513).

Baccharis sagittalis, DC. Prodr. v. 425. Near Valparaiso, Chili (1563).

Baccharis genistelloides, Pers. Syn. ii. 425. Unduavi, 8,000 ft. (1564).

Baccharis retusa, DC. Prodr. v. 412. Yungas, 6,000 ft. (1572.)

Baccharis cassinoides, DC. Prodr. v. 412. Yungas, 6,000 ft. (1570).

Baccharis riparia, H.B.K. Nov. Gen. iv. 65. Yungas, 4,000 ft. (1571); near La Paz, 10,000 ft. (1573).

Baccharis floribunda, H.B.K. Nov. Gen. iv. 64, t. 325. Unduavi, 8,000 ft. (1583).

Baccharis Radin, Ph. Linn. xxxiii. 146. Tacna, Chili (1586).

Baccharis trinervis (Lam.) Pers. Syn. ii 423. Yungas, 6,000 ft. (1575; 1574); Mapiri, 5,000 ft. (1576).

Baccharis salicifolia (R. & P.) Pers. Syn. ii. 425. Reis, 1,500 ft. (1584).

Baccharis serrulata (Lam.), Pers. Syn. ii. 423. Near Valparaiso, Chili (1668).

Baccharis glutinosa, Pers. Syn. ii. 425. Near Valparaiso, Chili (1561).

Baccharis scandens (R. & P.), Pers. Syn. ii. 424. Sorata, 10,000 ft. (1585).

Baccharis alpina, H.B.K. Nov. Gen. iv. 48. Sorata, 13,000 ft. (1632).

Baccharis microphylla, H.B.K. Nov. Gen. iv. 53. Near La Paz, 10,000 ft. (1581); Yungas, 6,000 ft. (1566); Sorata, 8,000 ft. (2614).

Baccharis microphylla, H.B.K. var. *lincarifolia*, Wedd. in Bull. Soc. Bot. France xii. 81. Sorata, 8,000 ft. (1577).

Baccharis dracunculifolia, DC. Prodr. v. 421. Yungas, 4,000 ft. (1568); Unduavi, 8,000 ft. (1569), the latter a narrow-leaved form.

Baccharis aphylla, DC. var. *Boliviensis*, Sch. Bip. Bull. Soc. Bot. France, xii. 81. Unduavi, 8,000 ft. (1567).

Baccharis Pingræa, DC. Prodr. v. 420. Near Valparaiso, Chili (1562).

Baccharis rosmarinifolia, H. & A. Bot. Beechey, 30. Valparaiso, Chili (1560).

Baccharis eupatorioides, H. & A. Journ. Bot. iii. 122. Valparaiso, Chili (1559).

Baccharis spartea, Benth. Sorata, 8,000 ft. (1587).

Baccharis hemiprionoides, Buck., fide Sch. Bip. Bull. Soc. Bot. France, xii. 81. Near La Paz, 10,000 ft. (1578). The same as Mandon's 186.

Baccharis pulchella, Sch. Bip. Bull. Soc. Bot. France, xii. 81, name only. Sorata, 8,000 ft. (1746).

Baccharis, resembling *B. cassinefolia*, DC., but stem densely pubescent above. Probably an undescribed species. Mapiri, 10,000 ft. (1579).

BACCHARIS HETEROTHALMOIDES, spec. nova. Fruticosa, erecta, ramosa, 10–16 cm. alta; ramulis gracilibus, angulatis, glabris; foliis lineari-subulatis, rigidis 1–2 cm. longis, ½ mm. latis; capitulis foeminis terminalibus, solitariis, pedunculatis, 1 cm. altis; involucrum 3–4–seriale, squamis lanceolatis, acuminatis, ½ mm. latis; receptaculo plano, punctato; achenia striata, linearia; pappus sub 2–serialis, scaber.

Yungas, 4 000 ft. (1709).

Baccharis? Unduavi, 8,000 ft. (1727).

Heterothalmus Boliviensis, Wedd. Chlor. And. i. 179, t. 31 A. Near La Paz, 10,000 ft. (1698).

Dolichogyne (*?*) Unduavi, 8,000 ft. (1711).

Pleuchea odorata (L.), Cass. Dict. 42, 3. Yungas, 4,000 ft. (1726). Same as Mandon's 206.

Notes Upon Monilia fructigena, Pers. and Spore Germination.*

By Byron D. Halsted.

During the middle of last May the writer brought a quantity of Cherry Rot fungus (*Monilia fructigena*, Pers.) from Mississippi, where he gathered it upon the excrescences of a wild plum caused by *Taphrina pruni*. At that time the cultivated cherries in New Jersey were about the size of peas, and limbs bearing the fruit were placed in tall glass dishes containing water and covered with high bell jars. The fruit of one jar was inoculated with the Mississippi *Monilia*, and after forty-eight hours there was a fine supply of the fungus covering the fruit, while the corresponding jar, with fruit untreated, ripened in due time, the cherries free from the decay.

It is with this out-of-season laboratory supply of *Monilia* that the following experiments were made. It was soon determined that the *Monilia* spores were particularly well adapted for the study of germination. In distilled water, at ordinary temperatures, they quickly send out the single germ-tube, and nearly always at one side of the oval hyaline spore. It requires from one to two hours for the production of a tube of a length exceeding that of the spore. In some cases, after five hours the tube was five to ten times the diameter of the spore. Inoculations were easily made upon green and ripe tomatoes, and various other vegetable substances, all demonstrating that this species of fungus is not confined to the stone fruits, where, however, it does its greatest damage; but will grow upon a wide range of organic compounds. Comparative tests were, however, made in pure cherry juice and that of tomato, for example, and it was shown that the rate of development was about three times as fast upon cherry as tomato juice. Comparative tests were also made between spores in pure water and those in cherry juice. While they grew well in the distilled water, the rate was greatly augmented by the cherry juice, and in forty hours there was a fine crop of spores, borne upon stalks, rising above the cherry juice, while no spores had been produced in the glass-slip well containing only the water.

* Read before Botanical Section of Association of American Agricultural College and Experiment Stations at Washington meeting, Aug. 15, 1891.

Of more interest were the results obtained by testing the action of fungicides. The substance tested was the ammonical carbonate of copper compound, and of various strengths, beginning with the strongest; that is, three ounces of the carbonate of copper to one quart of ammonia. By this the spores were killed, as also by the half, fifth and twentieth strength. An extreme dilution was then substituted, namely, a one per cent. strength of the fungicide as used for spraying grapes, etc.; that is, one part of the ordinary vineyard strength was added to ninety-nine of pure water, which gave a liquid that contained so little of copper as to require a most delicate chemical test to detect its presence. In such a solution the spores would not germinate, but after several days, when the spores were washed five times and placed in pure water, they grew slowly. In order to carry the test a step farther, slides with pit-cells were arranged, with pure water in each, but into alternate ones a small bit of thoroughly polished copper foil was dropped, the piece being in area equal to the lead at the end of a Faber pencil. That the presence of this minute amount of metallic copper should prevent the germination of the spores was surprising, and only after many trials was the fact accepted. In only one case, in a score or more, was any spores with the copper found with tubes, and in this they had probably formed before the sowing was made. In no instance was there any failure of the spores to grow in the check-cells with pure water only. That there might be no chance of any oxide of copper or other soluble compound being present, the foil was thoroughly scoured and rubbed to a bright polish. After the bit of copper was removed and the water changed, the spores would sometimes germinate, the degree of activity depending somewhat upon the length of time they had been held in check.

If now in place of pure water in a fresh preparation a percentage of cherry juice is added to the slide-well, the spores grow, the rate depending upon the amount of stimulating fluid added. A point could doubtless be reached at which the action of the nourishing fluid would just equal that of the copper, and the spore would remain alive and inactive indefinitely.

While at first sight there does not seem to be any practical bearing for these results, upon a further consideration it may

teach the truth that fungicides, as at present employed, are far stronger than they may need to be. If a bit of metallic copper in pure water will hold its own weight, or many times that, of spores inactive, it seems likely that the time has come to try a weaker solution of copper.

Since the above was written opportunity has offered to test the spores of a species of *Fusarium* and those of *Cercospora Apii*, the celery blight, both of which germinate with remarkable rapidity in water. When surrounded with their congenial food, that is, an extract of the host-plant, the rate over that of pure water is augmented many times. When copper is added to the water the spores fail to germinate, or in short, the results are the same as those reported for *Monilia*.

Similar experiments have been made with metallic zinc, but even when the spores were literally surrounded by the granulated metal they grew with vigor. A powdered form of metallic zinc was also used, and even in abundance had no retarding effect.

Some Notes on Tripterocladium leucocladulum, Muell.

As already noted in the BULLETIN, xviii. 55, this species, but once before found in fruit, has again been collected fertile.

In April, 1890, we first observed it, depending in long, wide festoons, sterile, from shelving granite ledges along the shores of Lake Pend d'Oreille, Idaho; a month later, up a cañon, we found it again, abundantly fertile, growing very luxuriantly in large, compact masses, on ledges of dolomite as well as on the trunks and branches of *Taxus brevifolia* and *Thuya gigantea*. Last spring we met it again, fertile, on ledges of porphyritic-granite.

As is the case with most of the mosses here, it fruits at any season of the year, all depending upon the rainfall, but most abundantly during the winter when covered by four to six feet of snow.

The species varies greatly in its mode of branching, leaves, capsule, length of pedicel and size of plants. Typically, the primary stem is long, creeping, very slender, brown, of a horny consistency and sparsely beset with very small squamiform leaves. From it arises long, slender flagelliferous branches 8-15 cm. long, and shorter and more robust ones 4-6 cm. in length. The flag-

elliferous branches are mostly irregularly branching, sometimes quite simple and exceedingly attenuated. The leaves on them are very closely appressed and at frequent intervals tufts of long radicles are produced. They usually bear numerous female buds, the archegonia of which seldom develop into spore-bearing capsules.

The other variety of branches arising from the primary stem is coarse, stout, sub-pinnately branching with large leaves more or less spreading. They are not commonly produced into flagella, and are densely beset with female non-radiculose buds. By reason of the squarrose tips of the perichætial leaves, these buds are quite conspicuous, resembling little burs.

The Manual says as to inflorescence, "flowers monœcious;" "pseudo-monoicus," would be more correct. We find male buds sparingly on the stems that bear archegonial inflorescence, but the antheridia in these buds I have not yet found otherwise than abortive.

The perfect male buds are developed on separate stems, (plants)? are found in the axils of the leaves and as terminations of short lateral branches. This latter condition is only apparent, not real, for careful dissection shows that the stem is always slightly prolonged beyond the bud, thus maintaining its lateral position. Very few of these short bud-bearing branches develop beyond the point where the first bud is formed, except as noted above; usually several buds are produced at this place, or a rosette of leaves, or the branch dies. The buds contain two to three oblong antheridia $\frac{170}{70} = \frac{190}{90}$ mic., with few paraphyses.

The capsule varies from oval to cylindrical, erect, cernous or sometimes pendent, constricted under the orifice or not, broad-mouthed or with a very small orifice. Manual says "teeth latticed;" this is only the case when the operculum is first lifted. The trabecula are seen joined, very delicately, soon, however, breaking apart. The leaves on the fertile stems are mostly ovate, narrowed into a long or short accumination; on the flagella the leaves assume a more elongated outline and the point becomes longer.

I have not seen the types from which the characters of *Tripterocladium leucocladulum* were drawn but, fide E. G. Britton, they

compare with my No. 241 of Idaho mosses, the species referred to above. Upon comparison with No. 469 of Macoun's Canadian mosses, *Platygyrium rupestre*, Kind., later *Tripterocladium rupestris*, it is impossible to avoid the conclusion that Macoun's No. 469 merely represents the flagelliferous state of the plant, with more elongated and longer acuminate leaves than the fertile plant characterized in the Manual.

JOHN B. LEIBERG.

Ballast-Plants at South Bethlehem, Penn.

Near the iron furnaces of that inland city are large heaps of ores brought over the seas as ship-ballast from Spain, Africa, and the West Indies, and transported thither by railroad from New York. On these heaps, as usual, foreign plants have appeared, a few of which were first observed some years ago by Messrs. C. N. Lochman and E. A. Rau, but during the past two seasons quite a number were collected by Mr. Robert G. Bechdolt, who placed them in my hands for determination, and a list is given below. It is worthy of note that they all, except two—*Chrysanthellum procumbens*, Rich. and *Euphorbia Terracina*, L.—have already been reported as occurring on the ballast-grounds at New York, Camden, and Philadelphia.

Brassica Sinapistrum, Boiss.
Sisymbrium orientale, L.
Erysimum repandum, L.
Saponaria Vaccaria, L.
Polycarpon tetraphyllum, L. f.
Tribulus terrestris, L.
Cytisus scoparius, Link.
Melilotus Indica (L.) All.
Trifolim procumbens, L. var. *minus*, Koch.
Medicago lupulina, L.
Medicago denticulata, Willd.
Vicia sativa, L.
Vicia hirsuta, (L.) Koch.
Scorpiurus subvillosa, L.
Sherardia arvensis, L.
Calycera balsamitæfolia, Rich.

Erigeron acris, L.
Inula viscosa, Desf.
Xanthium spinosum, L.
Chrysanthellum procumbens, Rich.
Heliotropium Europæum, L.
Anchusa officinalis, L.
Convolvulus arvensis, L.
Solanum nigrum, L., var. *villosum*, Mill.
Verbascum sinuatum, L.
Antirrhinum Orontium, L.
Amarantus deflexus, L.
Amarantus Blitum, L.
Chenopodium album, L., var. *viride*, Moq.
Roubieva multifida, (L.) Moq.
Polygonum hernarioides, Del.
Euphorbia Peplis, L.
Euphorbia Peplus, L.
Euphorbia Terracina, L.
Mercurialis annua, L.
Cyperus rotundus, L.
Cynodon Dactylon, (L.) Pers.

THOS. C. PORTER.

Notes on the Development of Conidia-Bearers in Acrostalagmus, Corda, sp. und.

BY CONWAY MACMILLAN.

(Plate CXXIII.)

On decaying stems of *Dahlia* in the plant-house of the University of Minnesota an interesting fungus belonging to the Hyphomycetes has been observed, sometimes in abundance. It forms tenuous coatings of loosely woven filaments on the *Dahlia* stems, and from these coatings arise delicate, erect, jointed filaments bearing whorls of conidial-branches acropetally arranged, becoming less and less mature as one passes nearer to the tip of the erect filament. These upright hyphæ are about one millimeter in length, and, when abundant, form little forests of conidia-bearers (*conidiaträger*) upon the diaphanous mycelial network,

which is closely appressed to the epidermis of the dead *Dahlia* stem.

Under the low magnification of an ordinary Leitz dissecting microscope these tree-like condia-bearers are very distinctly differentiated. The central stouter filament may be detected running from the mycelial cushion to the very end of the conidia-bearer. Along the upper two-thirds it is covered with the close whorls of conidial-branches, arranged for the most part in fours, and becoming briefer and less complicated towards the summit, until, near the apex, they become reduced to slight protuberances barely prominent on the sides of the erect, stout, central filament. The very apex of this central filament is prolonged into a cylindro-conical hypha, so that the whole shape of each conidia-bearer may be roughly compared to the contour of a half-grown tree of *Pinus Strobus*, L., or perhaps even better, to some of the slenderer species of *Araucaria* with their distinctly whorled branches. Examination of a considerable number of plants was made, under powers of from four hundred and fifty to nine hundred diameters, and several different stages in the maturation of the conidia-bearers were noted in detail. An effort was made to trace the complete development of these organs.

The first appearance of the conidia-bearer is as an erect, densely protoplasmic protuberance from a thread of the mycelial cushion. This protuberance increases rapidly in length, retaining throughout its growth a strong zenotropic (apogeotropic) irritability, and a horizontal septum is developed, cutting off a distal, from the basal cell. The distal cell, together with the basal cell, undergoes further elongation, and in the considerably denser contents of the distal cell numerous vacuoles make their appearance, but, in so far as seen, do not attain to any very great size, remaining, on the contrary, about one-quarter the diameter of the cell in which they appear. Synchronously there appear protuberances, at first scarcely perceptible, then rapidly elongating into thread-like projections, upon the wall-area of the distal cell. Originally these protuberances are isodiametrical, but before they equal in length the diameter of the cell producing them a swelling in the free end of the projection is seen to take place. The growth of the branch now continues in such a way that the

central filament of the conidia-bearer supports four lateral club-shaped branches, each of which is elongated considerably—perhaps one-fortieth mm. from insertion to apex—and stands very nearly at right angles with the central filament and with the two adjacent sister-branches in the same whorl. Before any whorl has arrived at this stage the next whorl above will be seen to be developing as filamentous outgrowths, or as projections, from the central hypha.

After having assumed the club-shaped appearance just described, the branch-hypha elongates further, becomes distinctly vacuolated and swells somewhat along its whole extent in such a manner that the points of greatest constriction are just at the insertion of the hypha, and just below the club-shaped apex. Further development now takes place in the terminal swollen area of each branch-hypha in such a way that the extreme apex is prolonged into a conical point, and four similar conical projections appear equidistant from each other around the equatorial region of the terminal swollen area. Each of these five projections thus formed continues its growth and behaves much as did the parent branch-hypha. Thus five secondary branch-hyphæ are produced, or four, if we choose to consider the terminal projection as a continuation of the primary branch-hypha. Each of the five projections develops a ternary five-lobed projection, and in rare cases each ternary lobe may develop a series of five quaternary lobes. In the formation of secondary, ternary and quaternary lobes or branches the whorled arrangement is not original, but is the result of post-developmental compression, differing from the formation of the primary branch-hyphæ. In this latter case alone did the whorl seem to be a true whorl. The development of ternary lobes is usually not followed by the elongation and differentiation of each lobe into a hypha and quaternary-lobe-series. This was noted in but one conidia-bearer among over two hundred.

The ternary lobes (or quaternary in cases where they occur) are the conidial areas. The process of forming the conidia is as follows:

Each lobe becomes swollen into a more or less spherical shape, and the greater part of the convex surface becomes at first faintly rugose. Later it is seen to be covered with small hemi-

spherical buds. These buds undergo basal constriction and become more or less distinctly obovoid in appearance. The buds, which are destined to become the conidia, do not extend into the concavities of the lobe-system or into the interlobal areas of the secondary branch-hyphæ. They remain thickly aggregated upon the convexities. They develop more rapidly upon the lateral ternary lobes, and more slowly upon the terminal ternary lobes. Likewise the development is, as a whole, more rapid upon the lateral secondary branch-hyphæ than upon the terminal. These facts are strictly in accord with the acropetal development of the whole conidia-bearer.

Each conidial area, at first simply regose from the crowded projections on its surface, gradually becomes clothed with the oborate buds which grow and become abstricted into fusiform or somewhat acutely ovate conidia, 6-7=2½-3½ $\mu\mu$ in diameter. In a single conidia-bearer one may see all the gradations in the branch whorls, from the mere projecting warts towards the apex to the ternary or quaternary lobed branches near the base. In all cases examined the basal third of the central filament does not become clothed with primary branch-hyphæ, but remains unbranched, septate, thick-walled, as a supporting trunk.

Examination of mature conidial-branches shows an increase in the size of the vacuoles until in the branch which has completed the abstriction of its conidia we find only traces of protoplasm in the hyphæ and lobes, the greater portion being occupied by the enlarged coalescent vacuoles.

No septæ have been observed in any part of the conidia-bearer except in the central filament. Here, too, they are principally confined to infraconidial areas, and occur very rarely between successive whorls of primary branch-hyphæ. This fact, taken in connection with the great enlargement of vacuoles in mature conidial-branches, may be considered as a physiological adaptation by which the transfusion of protoplasmic substances into the distally situated conidia is always easily brought about, there being no membranes in the way to compel dialysis.

The whole plant is hyaline or whitish, and would seem to be quite certainly in the genus *Acrostalagmus*, Corda, although the mucilage layer surrounding the conidia—distinguished by Ber-

lese, thus correcting the older view of a capsular wall—was not satisfactorily demonstrated. It certainly is not *Botryosporium*, which is the only genus of Hyphomycetes mentioned by Farlow and Seymour as occurring on North American plants of *Dahlia variabilis*, Desf. The conidia themselves were carefully studied, and a few cultnre experiments were made with negative results.

The conidia are mediumly thick-walled, hyaline. The cells of the central filament, in the infraconidial portion, were, in specimens measured, from 10 to 18 μ in diameter, and from 10 to 40 μ in length. The cell contents in the infraconidial portion were pretty free from granular substances, and were in some cases slightly refringent; but in the conidial portion the cell contents became decidedly granular. This granulousness was most marked in the terminal area of the central filament, where, too, glycogen-tests revealed an abundance of this substance.

Very good diagrammatic representations of *Acrostalagmus* conidia-bearers is given in Fig. 3 on p. 37 of Zopf's Die Pilze, but this considers only a simple case where the branching is not even secondary, to say nothing of ternary or quaternary. Fig. 3, p. 42, of the same work gives a rather better idea of the more complicated forms, such as have been described above.

DESCRIPTION OF PLATE CXXIII.

Figures illustrating the development of conidia-bearers in *Acrostalagmus*, Corda, *sp. und.* All were drawn under Leitz obj. 7, 9 and $\frac{1}{12}$ with the Abbe Camera, from specimens cultivated on stems of *Dahlia variabilis*, Desf, in the plant-house of the University of Minnesota, May, 1891.

Fig. 1.—Tip of central filament, showing mode of origin of primary branch-hyphæ in whorls of fours.

Fig. 2.—Young branch-hypha.

Fig. 3.—Older branch-hypha, showing origin of secondary branch-hyphæ.

Fig. 4.—Still older branch-hypha, showing secondary hyphæ more fully developed and producing the temary lobes.

Fig. 5.—Conidia, abstricted and showing fusiform or sharply ovate shape.

Fig. 6.—Branch-hypha, showing developed secondary hyphæ and ternary lobes, some of which are bearing immature conidia. Illustrates also the acropetal succession of conidia.

Figs. 7, 8, 9.—The first appearance of the conidiophore and the segmentation of the primitive bud.

Fig. 10.—A single conidial lobe showing method of conidial abstriction. (Optical section).

Some Duplicate Binomials.

By Conway MacMillan.

The suggestion in the September Torrey Bulletin regarding duplicate binomials is so excellent that it will scarcely fail of universal adoption (after a season of recalcitrant objection), even in that peculiarly overshadowed field—the American, spermaphytic, systematic botany.

A few duplicate binomials are here appended. The writer chanced upon them while indexing the Spermaphytes of the Minnesota Valley:

Apios Apios (Linn.).

Apios tuberosa, Mœnch. Meth. 165 = *Glycine Apios*, Linn. Spec. ed 1. 753.

Symphoricarpos Symphoricarpos (Linn.)

Symphoricarpos vulgaris, Michx. Fl. 1, 106 = *Lonicera Symphoricarpos*, Linn. Spec. ed. 1. 175.

Diervilla Diervilla (Linn.).

Diervilla trifida, Mœnch. Meth. 492 = *Lonicera Diervilla*, Linn. Mat. Med. 62; Spec. ed. 1. 175.

Taraxacum Taraxacum (Linn.).

Taraxacum officinale, Weber Prim. Pl. Holst. 56 = *Leontodon taraxacum*, Linn. Spec.

Oxycoccus Oxycoccus (Linn.).

Oxycoccus palustris, Pers. Syst. = *Vaccinium Oxycoccus*, Linn. Fl. Dan. 1. 80.

Pentstemon Pentstemon (Linn.).

Pentstemon pubescens, Solander Ait. Kew. II, 360 = *Chelone Pentstemon*, Linn. Mant. 415.

Corallorhiza Corallorhiza (Linn.).

Corallorhiza innata, R. Br. Ait. Kew. 5, 208 = *Ophrys Corallorhiza*, Linn. Spec. 1. ed. 945.

The writer fails to see wherein the strictures upon this method of naming, found in *Pittonia*, 1891, pp. 213-215, are applicable. It is not so important that the names of plants should meet with the approval of someone's more or less highly cultivated and certainly individualized æsthetic sense, as it is that they should be made to conform to some simple and iron-clad law. The law of priority should be one without exceptions.

Comparison of the Suillivant Catalogue of the Plants of Franklin County, Ohio, with the List of 1891 by Selby and Craig.

A little more than fifty years ago Mr. Wm. S. Sullivant published a catalogue of the phænogams and vascular cryptogams of Franklin County, Ohio.

A revision of this catalogue, with such additions as have been observed, has been published, and the object of this note is to point out the number of new plants introduced into a central county of Ohio during the last half century. The interest in a comparison of these two plant lists is increased by the fact that the surveys and explorations of the county by Prof. Sullivant and his co-laborers of fifty years ago were for that time industrious and painstaking.

Franklin County is a fair type of the counties occupying the drift-covered region of central Ohio, and shows the intimate relation of a flora to the geological formation, climatic condition and topographical features of the district included within its limits.

I have tabulated in order of their sequence the natural orders which are now represented by ten or more species.

	Additions.		Total. in County.
	Introduced.	Total.	
Ranunculaceæ	3	7	30
Cruciferæ	9	13	31
Violaceæ	1	4	11
Caryophyllaceæ	1	1	13
Leguminosæ	7	9	40
Rosaceæ	2	8	36
Umbelliferæ	3	5	24
Rubiaceæ		5	13
Compositæ	20	53	140
Primulaceæ	1	3	11
Solanaceæ	5	6	10
Scrophulariaceæ	2	2	29
Labiatæ	5	10	42
Polygonaceæ		4	22
Euphorbiaceæ	13	4	10
Urticaceæ		2	13
Cupuliferæ		3	14
Orchidaceæ		3	19
Liliaceæ	1	2	25
Cyperaceæ		5	75
Gramineæ	5	14	79
Filices		2	25
Ophioglossaceæ		2	5

Total in County	1002
In Old Catalogue	779
Introduced Plants	15%
Additions	223
Introduced, nearly	40%

W. R. Lazenby.

The Host-Plants of Aphyllon fasciculatum.

By E. J. Hill.

The parasitism of this plant has mainly, but not exclusively. been fixed upon species of *Artemisia*. It has been known to grow on the roots and buried cuttings of *Pelargonium zonale* cultivated in pots in greenhouses.* In the "Synoptical Flora of North America," Gray's "Manual of Botany," and Coulter's "Rocky Mountain Botany," the host-plants are said to be *Artemisia*, *Eriogonum*, etc. What the convenient but tantalizing *et ceteræ* may cover is hard to tell. It may be facts or guesses to gloss over inadequate observations, or some difficulties in tracing the connection between the host-plant and parasite. The variety *luteum*, found by Dr. Parry in Wyoming, is, on the above authorities, said to grow on the roots of grasses. In the Botany of the Wheeler Survey, Dr. Rothrock mentions only *Artemisia frigida*, Willd. "To this we frequently find *Aphyllon fasciculatum*, T. and G., attached, parasitic attachments uniting the roots of the two." † "*Aphyllon fasciculatum*, Gr., Colorado. Attached by its rootlets to those of *Artemisia frigida*." ‡ Here the connection was evidently traced, though the language is hardly accurate, since there are no roots or rootlets belonging to *Aphyllon*, these all pertaining to the other member of the couple. Macoun says of it, "Parasitic on the roots of *Artemisia* on sand hills and prairies." § Parry ‖ mentions it growing on "bare granite rocks along the upper Minnesota River," but does not specify the attachments to other plants. It would be very interesting to study the connection in a locality like this.

Doubts have been expressed whether the limitations of the parasitism to *Artemsia* is not too restricted. Among these doubts some refer to plants growing in Northern Indiana, a few miles east of Chicago.¶ This is the only locality where I have found this *Aphyllon*, and under conditions very favorable for observing its habits. It was first detected in 1884, and has been frequently

* Bull. Torr. Bot. Club, xiv. 220. Bot. Gaz. xii. 235.

† U. S. Geol. Sur. W. of 100th Merid. vi. 176. ‡ l. c., p. 217.

§ Cat. of Can. Pl., Parts I-III, 373.

‖ Geol. Sur. of Wis., Iowa and Minn. (Owen), p. 616.

¶ Bull. Torr. Bot. Club, xvi. 216, 330.

noticed since. Probably a hundred plants have been examined, most of which have been dug up, and the connection with the sustaining plant in many cases traced and verified. But in order to remove all doubts which may have arisen or been left in my own mind, the most extended and careful observations were made the past summer, since the locality was convenient and the material abundant. As far as these investigations have extended, they indicate that *Aphyllon* in this place grows on *Artemisia* alone, and the experience obtained by searching for connections with other plants goes to show that such relations are extremely problematical. And while it would not be safe to say that it may not also be found attached to other plants here, since there is evidence that it can grow on *Pelargonium*, *Eriogonum* and grasses, I have failed to find it on *Arctostaphylos Uva-ursi*, or any grass-plants on which it was inferred to be parasitic. Nor would any proof be deemed valid which did not show the union of the two plants.

Aphyllon fasciculatum, Gray, is a common plant by the shore of Lake Michigan, between Edgemoor and Pine, railway stations in Lake Co., Ind. It is especially abundant near the latter place. In their season hundreds of plants can here be found growing in the loose sand, partially shaded by scattered trees or clumps of *Pinus Banksiana*. This sand affords unusual facilities for tracing the connection between the host-plant and parasite, since it is easily dug up, though the root fibrils on which the haustorium is often formed are so delicate as to sever the connection by very slight disturbance, and require most careful handling. In some cases the inference might be drawn that there was no host whatever, if judged by superficial appearances. A little experience showed that surface indications were a deceptive clue to the subterranean connections. An *Aphyllon* might stand very near a bunch of grass, or shoot up even among the trailing stems of *Arctostaphylos*, but the thread-like root joining the plants led invariably to an *Artemisia*. Some were found within an inch or two of an *Artemisia* plant, and the inference was natural that they were joined, but the real host would be a foot or two away.

This led to a careful study of the root-system of *Artemisia*—n the present case *A. Canadensis*—and its comparison with those

of other plants growing in the sand. It has a vertical tap-root six or eight inches long, from which long, slender branches are sent off horizontally, so that the sand is quite well pervaded by those coming from various plants. They run along beneath the surface at a depth of two to six inches—most commonly at two to three inches—and hence are easily reached by the stem of the *Aphyllon*. They are very slender, barely more than an eighth of an inch in diameter when they leave the main root, so that they are thread-like in appearance, changing their dimensions quite imperceptibly. In all cases of interest they were accurately measured when freshly taken from the ground, and the distance of the *Aphyllon* from the main root ascertained. The longest distance was forty-three inches, the root in this case running quite direct. Others stood at the distance of thirty-seven and thirty-three inches respectively, and so on down to half an inch, or a close connection. Sometimes two or three are supported by the same root, or by different roots of the same plant.

These roots are somewhat sparsely furnished with hair-like fibrils, to which the parasite may be grown. It is in such cases that the connection is difficult to maintain, the fibrils being so easily broken off while digging the sand away. Hand-digging was the most successful in following the slender roots, which fortunately were found to be elastic and stronger than their size would indicate. After a few trials and comparisons they were readily distinguished from other roots pervading the sand, and followed among those of grasses and *Arctostaphylos*, the most common of the accompanying plants. They differed in color, structure and taste. Those of *Arctostaphylos* are dark red or brown, the outer bark loose and dark colored, the inner lighter. They are also woody and branch considerably. The roots of *A. Canadensis* are pale brown, the bark closely adherent and finely creased longitudinally, under the lens resembling the furrowed bark of a tree. They are also very finely crooked, and present a crinkled or a slightly spiral look when held before the eye, like that of a fibre untwisted from a thread. This gives them elasticity, for by taking a piece a foot or two long and stretching it, the kinks are straightened out but immediately reappear when the force is relaxed. And though species of *Artemisia* are com-

monly bitter, the roots of *A. Canadensis* are pungent, so much so that on tasting them quite frequently the pungency remained upon the tongue for a couple of hours after the work had ceased, leaving still longer a feeling of rawness. This test was very useful in cases where the *Aphyllon* became detached, for even the fibrils are sufficiently characterized by this taste to be distinguished. It is rare for the parasite to be without an attached fibril, unless it grows on some larger part of the root. The *Aphyllon* has a very bitter taste. Its haustorium is formed by an enlargement of the base of the stem, turned a little to one side. Through it the root of the *Artemisia* passes, and when the parasite is near the end of the root this soon terminates in a fibril an inch or two beyond the haustorium. Usually it does not branch except near the main root, but runs on singly, possessing the small rootlets only. The roots of the grasses, mostly those of *Calamagrostis*, *Panicum* and *Andropogon*, are tough and wiry, the bark loose and easily slipped off. They are commonly fuzzy with hairs to which particles of sand cling in abundance. To the taste they are insipid.

By applying tests like these no roots were found with an *Aphyllon* attached that did not accord with those of *Artemisia*.* It would be easy at times to draw a different conclusion from appearances on the surface, as when an *Artemisia* did not seem to be near enough to furnish the required support, but if one were within four or five feet it doubtless would serve. I do not know how far the roots of *Artemisia* may extend in the sand, but as they taper so imperceptibly the length may go considerably beyond the forty-three inches mentioned above, since the fibril in which they are apt to end is a sudden tapering relative to the part between the parasite and the tap-root. The roots of most plants in the sand are unusually long. I have traced those of *Cnicus Pitcheri*, a stout, branching plant a foot or two high growing in the same loose sand, to a distance of eight feet, and then lost them. Sometimes an *Artemisia* is invisible or easily over-

* In the recently published "Flora of Cook County, Illinois, and a part of Lake County, Indiana," it is said on my authority to be "a parasite on *Antennaria*." This is a mistake or faulty reading, for my note book, which the authors had for consultation, reads "parasitic on *Artemisia*."

looked, but on following the root from the *Aphyllon* a dead plant would be found, generally small and nearly or quite buried in the sand. Some withered and blackened leaves showed that it had started in the spring and grown for a while, but had evidently died of exhaustion, giving its life to sustain the parasite. This also would be dead under such conditions, having perhaps perfected its seed, though those on stronger hosts are perennial, the stems only dying after fruiting, the haustorium and parts adjacent being provided with buds for a new growth.

An Economic Mulberry.

The August issue of the BULLETIN contains an interesting note and figure of a Linden which had taken root in the decomposed wood of its own trunk, an occurrence by no means commonly observed and, as it seems, but rarely recorded. Not long ago, however, there appeared in one of our papers, as copied from an English paper, an account of an English Oak which had "sustained itself for years by a mass of roots grown into its own trunk!"

To the phenomenon described in the BULLETIN by Mr. Sargent for the Linden may be added a similar one lately observed in the trunk of a small White Mulberry, standing in the grounds of the Department of Agriculture. The conditions are essentially the same as those noted in the case of the Linden, except that the Mulberry is perhaps more seriously injured, a considerable portion of its trunk being destroyed by decay. The adventitious roots observed spring from the free border of a longitudinal crack where the trunk forks, the edges of the wound having been "healed" for some time, while the subsequent decomposition of the exposed inner layers of wood formed a quantity of mould, which, lying in contact with the healed borders, seems to have induced the growth of adventitious roots from one side into the decayed mass.

In considering the precise conditions under which this apparently peculiar growth is produced, as well as the fact that, as far as observed, the adventitious roots proceed only from vigorous, newly-formed wood, perhaps these cases may not be more phenomenal than the production of roots from a cutting, or from a

layered branch, where new wood is subjected to the same conditions, and therefore seem to be quite analogous to the case in which the Linden and Mulberry produced roots, if not an expression of the same law. The apparent incongruity exhibited by a plant deriving, as it seems, nourishment from its own body appears more striking at first thought than if we consider that the lignified part of any living trunk, if reduced by decay, is as fittingly a plant food as that which may be appropriated by the same individual from its own accumulation of decayed leaves, provided, of course, the necessary moisture is present in the humus. GEORGE B. SUDWORTH.

Forestry Division, Department of Agriculture.

Botanical Notes.

Sweet Potato Blossoms. While in South Jersey last fall I was much surprised to find one field of sweet potatoes in full bloom! Literally this was true, for upon any single square rod of the field there were hundreds of the large, handsome, pale pink, tubular blossoms, and many more buds preparing for anthesis. In conversation with a local botanist, and one who has always lived in the sweet potato region and among the plants for many years as a grower of "sweets," I learned that he had never seen a single bloom, and his face lighted up to such an extent when he obtained an herbarium specimen that it was an inspiration to me to send this note to the BULLETIN. If the blossom is such a rarity in New Jersey, the wonder is if the same is true in the Carolinas and further south, where its native haunts may possibly be, although to this generation they are unknown. It is possible that this particular field was set with plants of a strain foreign to the Jersey soil. BYRON D. HALSTED.

Mimulus moschatus, Dougl. in N. Y. State.—Some years ago I was told by a friend from here of finding the musk-plant in Saratoga County wild, which I would not believe. Later he tried to convince me by showing me living specimens, but I remained sceptical, as I always heard the plant was not hardy in our climate, and probably only an escape from cultivation. The 3d of July last, however, I drove out with the sportsman the twenty-five or more miles from here through West Milton to Middle

Grove, town of Greenfield, Saratoga County, following the course of the boisterous Kayderoserus to the mouth of the famous trout brook, Morehouse Brook, No. 1, about one mile northwest of Middle Grove village. The very first thing I met here after crossing the bridge were whole patches of the *Mimulus*, hanging over the banks of the brooklet, with their frosty foliage perfuming the whole atmosphere. Following the course of the water the plant was found wherever a clear space was left for the sun to shine upon the loamy soil. About one mile up the creek—in full view of the foot-hills of the well-known Adirondacks, the plant has its headquarters in a springy swamp, growing in all directions in the midst of the water, often two feet high. A trapper informed me of having known the plant here always and nowhere else in the neighborhood. How this far western plant came there I am not able to tell, but it is there and in great abundance. J. H. WIBBE.

[This species was found by the late Mr. Julius A. Bisky in 1886, growing in a boggy swamp, about two miles east of Locust Valley, Queens Co., Long Island, N. Y., on the right hand side of the Oyster Bay road. He reported it as perfectly at home, and scattered over a considerable area (BULLETIN, xiv. 13). A specimen from this locality is preserved in the Columbia College Herbarium.—N. L. B.]

Reviews of Foreign Literature.

Monographiæ Phanerogamarum. Vol. vii. Melastomaceæ. Alfred Cogniaux. (8vo. pp. 1256, Paris, July, 1891.)

M. Cogniaux's long-continued studies of the Melastomaceæ have culminated in the production of this fine volume. It contains descriptions of 2,702 species and 534 varieties. *Miconia* is the largest genus, containing 518 species. Seven genera accepted by Bentham and Hooker are rejected, and the following new ones proposed: *Schwackæa*, *Benevidesia*, *Bisglaziovia*, *Barbeyastrum*, *Beccarianthus*, *Boerlagea*, *Brittenia* and *Medinillopsis*. As in M. Cogniaux's previous monographs, the oldest unpreoccupied specific names satisfactorily ascertained are adopted. An appendix of twenty-two pages contains additional species, which have come to notice during the printing of the book, the main portion having been completed in September, 1889. N. L. B.

An Enumeration of all the Species of Musci and Hepaticæ recorded from Japan. Wm. Mitten. (Trans. Linn. Soc. iii. 2d. Ser. 153-206, t. 58.)

This is a most interesting contribution, as it enumerates forty-nine species which occur within our limits besides two previously known only from America, *Drummondia clavellata* and *Climacium Ruthenicum.* Of new species fifty-six are described and four figured. A few changes and remarks are worthy of notice. *Eustichium Savatieri*, Husnot, is changed to *Bryoziphium Savatieri*, Mitten overlooking the fact pointed out by Geheeb that *E. Japonica*, Berggren, antedates it by two years and therefore it should be *Bryoziphium Japonicum* (Berggren). *Campylopus Leanus* is reported sterile as with us, though said to fruit in India. On page 182 is noted the fact already well known that *Hypnum Flemmingii*, Austin, is identical with *H. robustum*, Hook. *H. paludosum*, Sull., is listed as *Amblystegium paludosum*, Mitten. E. G. B.

Faut-il dire Oscillatoria ou Oscillaria? Maurice Gomont. (Journ. de Bot. v. 273.)

The very complicated nomenclature of *Oscillatoria* is traced to the earliest known mention of that genus of fresh water algæ and the following synomyns established: *Oscillatoria*, Vaucher, Histoire des Conferves d'Eau douce, p. 165 (1803). *Oscillaria*, Pollini, Viaggio al Monte Baldo e al lago di Garda p. 36 et seq. (1816). Bosc. Nouveau dictionnaire d'histoire naturelle appliqué aux arts et à l'agriculture, xxiv. 196 (1818). Bory. Dictionnaire classique d'histoire naturelle i. 594 (1822).

In the Nouveau dictionnaire Bosc refers to "Oscillaires," wrongly termed " Oscillatoires " by Vaucher in his excellent memoir on fresh water algæ, but does not give any authority for the name he (Bosc) adopts, and which name, had he established it himself previous to the publication of Vaucher's work in 1803, he would doubtless have referred to. M. Gomont remarks that as Bosc wrote a number of memoirs in various publications in Europe, and also possibly in the United States, where he resided previous to 1803, there may still be something in existence on the subject unknown to him, and if so, anyone having any knowledge of any facts in relation thereto would confer a favor by communicating the same. A. M. V.

Index to Recent Literature Relating to American Botany.

A New Herbarium Pest. C. V. Riley. (Gard. and For. iv. 543, 544, fig. 84, 85).

An illustrated description of a new pest found in the herbarium of the Department of Agriculture, chiefly infesting plants from the southwestern part of the United States. It has been determined to be a new species of geometrid moth, under the name *Carphoxera ptelearia.*

Abies magnifica, var. *Shastensis.* (Gard. Chron. x. 430; f. 55)

Adiantum cuneatum. (Gard. xl. 360; illustrated).

Agave albicans. J. G. Baker. (Bot. Mag. t. 7207).

American Beech—The. (Am. Gard. xii. 742, 743; illustrated).

An account and full page plate of *Fagus ferruginea.*

American Buckeyes—The. (Gard. and For. iv. 517, 518, fig. 81).

Contains a representation of *Æsculus Californica.*

Annual Report of the State Botanist. Chas. H. Peck. (From 44th Ann. Rept. N. Y. State Museum Nat. Hist., Albany, Jan. 31st, 1891; pl. i-iv).

In the list of additions to the State Herbarium here noted are thirty-six species of fungi described as new, of which the following are figured: *Armillaria viscidipes, Crepidotus distans. Omphalia corticola, Pleurotus campanulatus, Saccharomyces Betulæ, Cortinarius albidus, Tricholoma grande, Ramularia graminicola, R. destruens, Cercosporella Veratri, Aspergillus aviarius, Septomyxa Carpini, Bispora effusa, Caryospora minor* and *Phyllosticta Lndwigiæ.*

Polypodium vulgare, L., var. *cristatum*, Lowe, is described and figured from specimens collected in Dutchess County.

The genus *Tricholoma* is made the subject of a monograph, and forty-eight species from New York are collected.

A list of the fleshy-fungi of Maryland, by Miss Mary E. Banning, is included. It numbers one hundred and seventy-nine species, of which fourteen are described as new. The manuscript, accompanied by one hundred and seventy–five colored plates, has been donated to the New York State Museum, where they have been bound in one large volume for safe keeping and preservation. The botanists of New York should certainly feel proud of this mark of appreciation from one outside the State,

and it ought to stimulate them to at least show equal zeal and interest in adding to the value and scope of the State Herbarium.

A. H.

Aster cordifolius. C. W. Dod. (Gard. xl. 337; illustrated).

Berberis aquifolium. (Gard. xl. 383, 384; illustrated).

California Wild-Flower Notes. K. P. S. Boyd. (Am. Gard. xii. 737, 738; illustrated).

Contains cuts representing *Abromia umbellata, Mimulus cardinalis, M. luteus,* and *M. glutinosus.*

Callirhoë Papaver. (Gard. xl. 541, with colored plate).

Calandrinia oppositifolia. (Gard. xl. 485; illustrated).

Catalogue of Flowering Plants and Ferns of Santa Cruz County, California. F. L. Clarke. (Pamph. pp. 13, Santa Cruz, Calif).

This list was compiled from specimens collected by the pupils in the public schools of Santa Cruz County, as a result of the "Wild Flower Contest," inaugurated by the *Santa Cruz Surf.* Additions to the list were made by Dr. C. L. Anderson, and the modest wish is expressed that the work may serve as a nucleus to which many additions may be made in the future.

Cereus procumbens. (Bot. Mag. t. 7205).

Colors of Flowers.—I. II. E. W. Hervey. (Gard. and For. iv. 568-570; 578-580).

The author seeks to show that nature begins in all colored flowers by a change from green to white, and thence to the brighter colors,—that this the line of the evolution of colors. In other words, that chlorophyl is first eliminated from the specialized leaves and a white subject prepared on which the more diverse colors can be painted. The other colors, the author concludes, do not follow each other in any sequence, but may spring directly from the white and are of equal rank. The examples given and the course of reasoning employed are interesting, to say the least.

Colors of Leaves. E. W. Hervey. (Gard. and For. iv. 591, 592).

This is a sequel to the author's previous article on the colors of flowers. The course of reasoning is similar, and the question asked is whether the green color of leaves is the original color, or is it secondary. The conclusion is reached that our green vegeta-

tion has been derived from white. The well-known fact is quoted that the cotyledons or embryo leaves of all plants are almost uniformly white, and this is considered significant. Both articles are suggestive, and offer unlimited field for the imagination.

Cucurbitacearum Novum Genus et Species. A. Cogniaux. (Proc. Calif. Acad. Sci. iii. 58-60).

Brandegea with two species, *Bigelovii* and *monosperma*, is described as new. Also *Echinocystis Brandegei.*

Couroupita Guianensis. W. E. Broadway. (Gard. Chron. x. 649, 650, f. 94).

Diatoms: Their Life-History and their Classification. Frederick B. Carter. (Am. Month. Mic. Journ. xi. 276-280; xii, 1-6; 81-85; 97-101; 121-123, pl. I, II).

That portion of this series of papers which relates to the structure and life-history of the diatomaceæ is very interesting, and may be read with profit by those who are making a study of these minute organisms. The discussion of the structure of the diatom frustule is particularly readable, considerable space being devoted to showing the confusion which has arisen from the use of the word *hoop* to designate what William Smith calls the *connecting zone*, i. e., that portion of the frustule which is seen in front view. By the by, Count Castracane aptly speaks of this view as the *zonal view*, a term which is more expressive than *front view*, and which, for that reason, should come into general use.

In treating this part of the subject, the writer surely nods a little, however. On page 84, in his remarks in reference to *Fragilaria*, he appears to have fallen into the error of supposing that all diatoms have the "pill-box" structure. But Prof. H. L. Smith, whom the writer quotes, distinctly mentions *Fragilaria* as one of the genera in which the edges of the hoops are simply opposed instead of sliding one over the other. (Lens, vol. 1, p. 72). In such a case, one would certainly not expect to find a diminution in the breath of the filaments.

A valuable part of the paper is that which discusses the range which must be allowed in the size of the frustules. It is undoubtedly the case that too frequently difference in size has been almost the only reason for constituting a new species.

In a paper of this character, intended to guide observers in the determination of genera, it is sincerely to be regretted that the author did not follow the classification of Prof. H. L. Smith, now so generally accepted. A number of the generic names mentioned are so ancient that their use is likely to create confusion.

The division into fresh water and marine genera is not at all a happy one. Of the thirty-four genera enumerated on page 98 as fresh water, eleven are also marine, while two others,—*Terpsinoë* and *Schizonema*—are exclusively marine. Nearly all the species of *Pleurosigma*, also, are either m arine or brackish. As *Navicula*, *Surirella*, *Campylodiscus*, *Synedra*, *Melosira*, *Nitzschia*, *Cocconeis* and *Achnanthes* are given among the fresh water and omitted from the marine genera, it is evident that the author ranks these as exclusively fresh-water forms. This is quite incorrect, as the number of marine species belonging to the genera named is, in most of them, even more numerous than the fresh-water species. Some of the most interesting forms commonly found in marine collections, are conspicuously absent from the list of marine genera, as, for instance, *Coscinodiscus*, *Amphiprora*, *Actinoptychus* and *Actinocyclus*. It is true that three of these are mentioned in the list of fossil forms, but then it is not made clear that the list of fossil forms given represents a marine deposit. Surely the writer must be aware of the fact that there are fresh water as well as marine deposits.

While the descriptions of genera were not intended to be minutely accurate, yet some of them are so loose as to be misleading. For instance, in telling how to distinguish *Campylodiscus*, *Surirella* and *Cymatopleura*, the statement is made that if the frustule is twisted the specimen is a *Campylodiscus*. This would sadly puzzle a beginner, for *Surirella* and *Cymatopleura* are also frequently twisted. The word "twisted" has been used to describe the shape of a *Campylodiscus*, but, to most minds, the old term "saddle-shaped" would be more expressive.

Perhaps it may not be amiss to add in conclusion that there is certainly no better guide to the determination of genera than is given in the "Conspectus of the Diatomaceæ," by Prof. H. L. Smith, first published in "The Lens," in 1872, but lately reprinted by Dr. Wolle in his work on *The Diatomaceæ of North America*.

C. H. K.

Directions for Collecting Recent and Fossil Plants. F. H. Knowlton. (Part B. Bull. 39, U. S. Nat. Mus. Pamph. pp. 46, illustrated, Wash. D. C., 1891).

Erythrina crista-galli. (Gard. xl. 516, with colored plate).

Flora of the Cape Region of Baja California. T. S. Brandegee. (Proc. Calif. Acad. Sci. iii. 108-182 ; also reprinted).

This work is the result of two trips made by the author during the autumn of 1890. The list includes six hundred and seventy-nine species and varieties, of which about thirty are fully described as new and some twenty-five more listed as such, but not described.

Filices Mexicanæ.—III, IV. (Gard. and For. iv. 519, 520, fig. 80., 555, 556, f. 88.)

Contains description and figure of *Notholæna rigida* n. sp. and *Pellæa Pringlei* n. sp.

Forest Vegetation of the Upper Mississippi.—III. (Gard. and For. iv. 531, 532).

Helenium autumnale. (Gard. Chron. x. f. 56).

Helenium autumnale. (Am. Gard. xii. 683, illustrated).

Hypericum Buckleyi. (Gard. and For. iv. 581, fig. 91).

Index to Economic Products of the Vegetable Kingdom in Jamaica.

This is a list of the plants most deserving attention for their medicinal properties or economic products. One hundred and thirty-eight are native to Jamaica and ninety-four naturalized or cultivated. The habitat of each plant, as well as its properties and uses, are given, but nothing is said of its value or importance, present or prospective on the island. Twenty-three of the species are also indigenous to the United States, from common plants like *Erigeron Canadense* and *Lycopodium clavatum* to subtropical trees like *Prosopis juliflora*, *Rhizophora Mangle* and *Carica Papaya*. The presence here of *Prosopis juliflora* (Mezquite) brings to the mind its wide dissemination in the new world, from California to the mouth of the Rio Grande, and from Colorado, through Mexico, to Panama, Nicaragua, Chili, Buenos Ayres and the West Indies. In Jamaica this tree is common and the wood largely used.

Besides the ordinary garden vegetables, which are not included, at least sixty more of the plants enumerated are cultivated or

susceptible of cultivation in our Southern States, such as *Arachis hypogœa, Camellia theifera, Chrysobalanus Icaco, Ananas sativa,* and species of *Citrus, Anona, Musa, Eucalyptus, Opuntia, Agave,* &c.

Jamaica, the largest and most important of the British Islands in the West Indies, has been especially favored by nature; high mountains, rising in several places to an altitude of nearly 8,000 feet, diversify its surface and materially affect the temperature and rain-fall of its different parts; many rivers spring from the foot-hills and water fertile lowlands. The climate and soil vary so much as to permit the culture of most plants from the northern temperate regions as well as those from the topics; thus, while the cinchona tree and coca are cultivated in the mountains, the coffee in the foot-hills and the cocoa on the coast lands, special attention is also being turned to the raising of garden vegetables with a view to supply the markets of the United States during the winter and spring.

The great staple of the island is still sugar-cane; coffee perhaps ranks next in importance. Cotton and maize are also generally cultivated. The most conspicuous and useful native trees are: *Swietenia Mahagoni* (mahogany), *Brosimum alicastrum* (bread-nut), *Eriodendron anfractuosum* (silk-cotton tree), *Dipholis montana* (mountain bully tree), *D. nigra* (black bully tree), *Sapota Sideroxylon* (naseberry bullet tree), *Sloanea Jamaicencis* (green-heart), *Amyris balsamifera* (rosewood), *Vitex umbrosa* (fiddle wood), *Laplacea Hœmatoxylon* (iron wood). Of the species of cinchona under cultivation, *C. Ledgeriana*, Mœns. is the most promising from the vigor of its growth and the large percentage of quinine in its bark. The Liberian coffee (*Coffea Liberica*) is also looked upon with growing favor. V. HAVARD.

Late Persisting Leaves on Trees. J. G. Jack. (Gard and For. iv. 567, 578).

Notes in regard to this subject are given for *Magnolia glauca, Quercus alba, Q. coccinea, Q. tinctoria, Q. rubra, Ulmus campestris, Juglans* sp., *Hicoria* sp., *Fagus* sp.

Lepachys columnaris. (Meehan's Month, i. 65, 66, Pl. 5).

Les Plantes Européennes introduites dans la Vallée du Minnesota. Conway MacMillan. (Rev. Gen. de Bot. iii. 289).

The phanerogamous plants of Minnesota number some thirteen hundred, nearly a third of which are of European origin. Prof. MacMillan gives a list of these according to their geographical distribution in the State, and indicates their course in penetrating into the interior.

Manzanita—The. (Gard. and For. iv. 565, 566, fig. 90).

Illustrated description of *Arctostaphylos Manzanita.*

Moonworts—The Exiled. G. A. Woolson. (Am. Gard. xii. 722-724).

A popular account of our common species of *Botrychium* and the legends and superstitions connected with them.

New California Carices. L. H. Bailey. (Proc. Calif. Acad. Sci. iii. 104-106).

Carex obnupta, C. quadrifida, C. quadrifida, var. *lenis, C. monile,* Tuckm. var. *Pacifica,* are described as new.

Notes on the Distribution of some Kansas Trees, III.—The Oaks. S. C. Mason. (Gard. and For. iv. 508-510)

Notes on *Quercus macrocarpa, Q. prinoides, Q. Muhlenbergii, Q. nigra, Q. tinctoria, Q. rubra and Ostrya Virginica.*

Notes on the Flora of Nova Scotia—Part I. Geo. Lawson. (Reprint, Trans. Nova Scotian Inst. Sci. Session of 1890-91, pp. 84-110).

This part includes from Ranunculaceæ to Anacardiaceæ. The author lays particular stress upon the fact that the work is to be considered as only preliminary, and that corrections and additions will be thankfully received. The notes are full, and the list when completed will be one of great value.

Our Native Nelumbo. (Gard. and For. iv. 556, fig. 87).

Illustrated description of *Nelumbo luteum* as it appears in a pond in Southern Illinois.

Pines, Hemlocks and Spruces. L. H. Bailey. (Am. Gard. xii. 646-648; illustrated).

Pinus resinosa, P. Strobus and *Abies Canadensis* are figured.

Pinguicula lutea. (Bot. Mag. t. 7,203).

Possibilities of Our Native Grapes (concluded). T. V. Munson. (Am. Gard. xii. 659-661).

The author concludes his account of what has been done in cultivating and hybridizing the native species of *Vitis.* It is a

contribution of great interest, and one which we venture to say will cause surprise to almost every one who has not made a special study of the subject.

Polygala in North America—The Genus. Wm. E. Wheelock. (Mem. Torr. Bot. Club, ii. No. 4, pp. 109-152).

This paper completes Vol. II of our "Memoirs." There has been no monograph of the North American *Polygalas* since their treatment in Torrey and Gray's Flora of North America in 1838-1840. Dr. Wheelock has studied the specimens contained in the larger American herbaria, and Dr. Britton has examined most of the types contained in European collections and has supplied notes thereon. Thirty-eight species are recognized. *P. Reynoldsiæ*, Chapm., is not regarded as distinct from *P. Rugelii*, Shutt.; *P. ambigua*, Nutt., is maintained as a species rather than a variety of *P. verticillata; P. viridescens*, L. is the name accepted for *P. sanguinea*, L., having priority of place on the page of the Species Plantarum, these two Linnæan species being identical; *P. Mariana*, Mill (1768) replaces *P. fastigiata*, Nutt. (1818); *P. Lindheimeri*, A. Gray, var. *parvifolia*, is a new variety from Arizona; *P. Tweedyi*, Britton, is a new species from Texas.

In spite of the most careful proof correction, two vexatious errors have occurred in the paper. On page 146, under *P. cucullata, P. Californica*, Nutt. is the name meant to be used as the date of it (1840) as against that of *P. cucullata*, Benth (1849), indicates, and on page 149 *P. ovatifolia*, DC., is uniformly spelled *P. ovalifolia*, DC.

Rose Acacia—The Large-Flowered. (Am. Gard. xii. 739, 740, illustrated).

Contains a figure of *Robinia hispida*.

Rosa Carolina. (Meehan's Month. i. 84, illustrated).

Sarracenia purpurea. (Meehan's Month. i. 81, 82, Pl. 6).

Sisal Hemp in the Bahamas and Florida. (Bull. No. 24, Bot. Dept. Jamaica, 10-15).

Some Strange Names among Indigenous and Other Drugs. (Pharm. Rec. xii. 377).

The following popular names are noted: "Coquetta" or "Bogota Bark" for *Cinchona condaminea;* "Cammock" for *Ono-*

nis spinosa; "Ginger Grass" for *Andropogon schoenanthus;* "Vermont" or "Canada Snakeroot" for *Asarum Canadense,* "Beerlap" for *Lycopodium* sp.

Struggle for Life in the Guianian Forest—The. Jas. Rodway. (Gard. Chron. x. 578, 579; 612, 613).

Mostly concerned with the orchid flora of the region.

The Action of Bacteria on the Rapid Souring of Milk during Thunder Storms. A. L. Treadwell. (Am. Nat. xxv. 1010-1012).

From experiments with milk and electrical discharges the author finds a slight hastening in the time of souring. If the milk is first sterilized, however, no souring is obtained. The conclusion is reached that the souring is not due to oxidation but to the more rapid growth of bacteria under the influence of the free oxygen or ozone generated by the electrical discharges. The small amount of ozone generated during a thunder storm is not considered sufficient to have any appreciable oxidizing effect either, and if rapid souring is produced it is to be attributed to the more rapid growth of bacteria in the sultry atmosphere.

The Specific Name of the Texan Cercis. E. L. Greene. (Gard. and For. iv. 562, 563).

Tillandsia argentea. (Gard. xl. 524, illustrated).

Water Garden—A Typical. (Gard. xl. 533, 534, illustrated).

Gontains a picture of a nook in the garden of Mr. John Gerard at Elizabeth, N. J.

Proceedings of the Club.

MEETING OF DECEMBER 8TH, 1891.

The President in the chair and forty-two persons present.

The subject of the evening, "The Flora of the Higher Catskills," was illustrated by lantern slides, made and shown by Mr. Van Brunt, further supplemented by herbarium specimens.

Miss Anna Murray Vail followed with a paper on the plants collected by her in the region of Onteora during the summer jus passed, and Miss Steele gave a short account of the flora in the neighborhood of Slide Mountain, illustrated by specimens of the rarer ferns and mosses.

Dr. Rusby announced that the prize of fifteen dollars offered

last spring for the best set of plants collected within one hundred miles of New York during the summer, had been awarded to Miss Vail.

Dr. Britton remarked upon the *Polemonium* which Mr. Van Brunt and Dr. Rusby had found in the Catskills, and hitherto supposed to be the *Polemonium cæruleum* of Europe. After comparison of complete plants from both countries, he has decided that the North American one must rank as a new species, and gives it the name of *Polemonium Van Bruntiæ*, in honor of Mrs. Van Brunt. The East American plant differs from the European one, especially in having horizontal root stocks and exserted stamens.

The species has been reported from Herkimer, Delaware, Scoharie, Ulster, Chenango and Tioga Counties, in New York State.

MEETING OF DECEMBER 30TH, 1891.

Mr. Hogg in the chair and twenty-three persons present.

Miss Delia W. Marble and Mr. Robert Demcker were elected active members.

The paper of the evening, "Friendly Bacteria," was then given by Prof. Herbert W. Conn, of the Wesleyan University.

ANNUAL MEETING, JAN. 12, 1892.

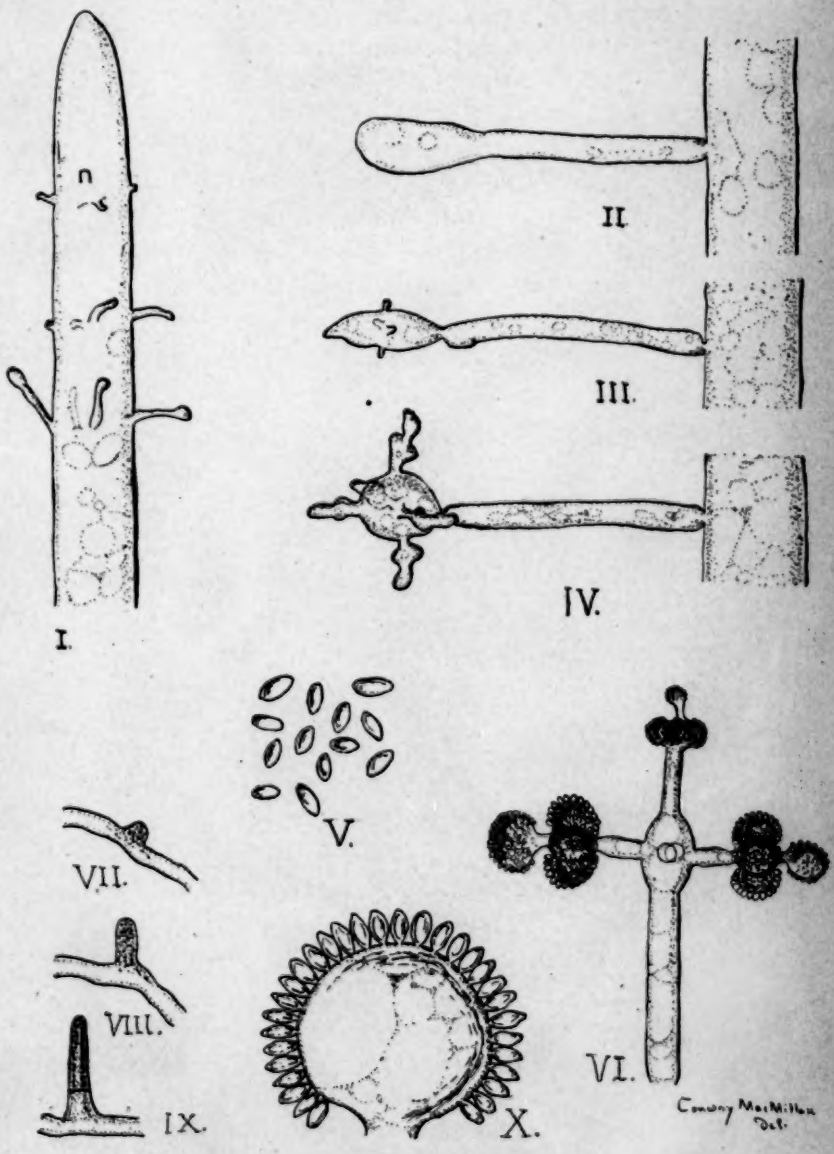
The President in the Chair and twenty-three persons present.

Reports of officers for the past year were read and accepted.

The following officers were elected for the year 1892: President, Hon. Addison Brown; Treasurer, Henry Ogden; Recording Secretary, Maria O. Steele; Corresponding Secretary, E. P. Bicknell; Librarian, Maturin L. Delafield, Jr.; Curator, Josephine E. Rogers; Editor, N. L. Britton; Associate Editors, Emily L. Gregory, Anna M. Vail, C. Henry Kain, Henry H. Rusby, Arthur Hollick.

The election of Vice-President was deferred until the first February meeting.

The announced paper of the evening was read by Mr. John K. Small on "The Flora of Western North Carolina and contiguous territory," copiously illustrated by specimens.



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of original articles published in the BOTANICAL GAZETTE during the year 1891. It is worth your while!

Undescribed plants from Guatemala. VIII, IX. (with plates I–II, XVI–XVIII) *John Donnell Smith.* 1, 191

On certain new or peculiar North American Hyphomycetes. I, II. (with plates III–IV, XIX–XX) *Roland Thaxter.* 14, 201

New grasses . . . . . *Geo. Vasey.* 26

Notes on the apical growth of Osmunda and Botrychium (with plate V.) . . *Douglas H. Campbell.* 37

Two new plants from the Cascade Mountains (with plate VI.) . . . . *B. L. Robinson.* 43

New species of Montana fungi (with plates VII and X) *J. B. Ellis and F. W. Anderson.* 45, 85

A key to the North American genera of Labiatæ *Alfred C. Stokes.* 49

Black rust of cotton: a preliminary note *Geo. F. Atkinson.* 61

Flowers and insects. VI. . . *Charles Robertson.* 65

Notes on technique. II. . *James Ellis Humphrey.* 71

A contribution to the life history of Hydrastis Canadensis (with plate VIII.) . . . . *Homer Bowers.* 73

Two undescribed species of Apodanthes (with plate IX.) *B. L. Robinson.* 82

New or noteworthy Compositæ from Guatemala *John M. Coulter.* 95

Notes on North American willows. VI. *M. S. Bebb.* 102

Notes on the flora of the St. Croix region *E. J. Hill.* 108, 126

On raised peat-bogs in New Brunswick *W. F. Ganong.* 123

A visit to the West Indies . . *A. S. Hitchcock.* 130

Notes on the apical growth of Liverworts (with plate XIII) *David M. Mottier.* 141

Some new Solanaceæ from Guatemala *John M. Coulter.* 144
New grasses . . . . . *George Vasey.* 145
Abnormal phyllotactic conditions as shown by the leaves or flowers of certain plants (with plate XIV) *Aug. F. Foerste.* 159
A study of some anatomical characters of North American Gramineæ. I, II, III. (with plates XV, XXI–XXIV) *Theo. Holm.* 166, 219, 275
On the organization of the fossil plants of the Coal-measures . . . . . *David White.* 172
On the relation between insects and the forms and characters of flowers . . . *Thomas Meehan.* 176
Notes on North American mosses *Charles Reid Barnes.* 205
Notes on Uredineæ . . . . . *J. C. Arthur.* 225
A sketch of the flora of Orono, Me. *F. Lamson-Scribner.* 228
The Future of Systematic Botany *John M. Coulter.* 243
Botanical papers at the Washington meeting of the A. A. A. S. 255
Botanical Club of the A. A. A. S. 261
The Botanical Section of the American Association of Agricultural Colleges and Experiment Stations *Geo. F. Atkinson.* 264
On the structure and dimorphism of Hypocrea tuberiformis (with plate XXV) . *Geo. F. Atkinson.* 282
Notes on the flora of Canada . *James M. Macoun.* 285
What the station botanists are doing *Byron D. Halsted.* 288
The sling-fruit of Cryptotænia Canadensis *E. J. Hill.* 299
Bacteria of the melons . . *Byron D. Halsted.* 303
Noteworthy anatomical and physiological researches *Conway MacMillan.* 305, 343
On the relationships of the Archegoniata *Douglas H. Campbell.* 323
A new herbarium pest . . . *C. V. Riley.* 334
Notes upon Peronosporeæ for 1891 *Byron D. Halsted.* 338
New plants collected by W. G. Wright in Western Mexico . . . . . *B. L. Robinson.* 340

BRIEFER ARTICLES—

Actinella (Hymenoxis) Texana, n. sp. *John M. Coulter* and *J. N. Rose.* 27
Anæsthetics and transpiration . . . . *Conway MacMillan.* 28
Observations on Notholæna Nealleyi and Pringle's no. 1864, '88 *Geo. E. Davenport.* 53
Sarcodes sanguinea . . . . . *Thos. Meehan.* 54
Erythræa Pringleana, n. sp. . . . . *Veit Wittrock.* 85
A new Aster from California (with plate XI.) . . *J. N. Rose.* 113
A new Fomes from northern Montana (with plate XII.) *F. W. Anderson.* 113
Silphium laciniatum . . . . . *B. L. Robinson.* 114
The propagation of Ranunculus lacustris . . *Chas. A. Davis.* 115
Cornus Baileyi in Oregon . . . . . *Walter H. Evans.* 118
Simple mechanism to show geotropism . *Goodwin D. Swezey.* 147
Notes from Columbus, O. . . . . *Aug. D. Selby.* 148
Continuity of the protoplasm in the Chantransia-form of Batrachospermum (*illust.*) . . . . . *Bradley M. Davis.* 149
A method of studying the growth of tubers *Conway MacMillan.* 149
A monstrous form of the common field daisy . *B. W. Barton.* 150
A suggestion on the proper terminology of the spermaphytic flower *Conway MacMillan.* 178
A curious case of germination in Citrus decumana *W. G. Farlow.* 179
Coursetia axillaris, n. sp. . . *John M. Coulter* and *J. N. Rose.* 180
Penetration of the host by Peronospora gangliformis (*ill.*) *W. H. Rush.* 208
Notes on the pollination of Helianthus . . . *Walter H. Evans.* 234
An abnormal water pore (*illust.*) . . . . . *C. R. B.* 235
A new grass . . . . . *Geo. Vasey.* 235
Fasciation in Cnicus lanceolatus (*illust.*) . . *J. W. Toumey.* 236
A new Eriogynia. Notes . . . . . *Wm. M. Canby.* 236
Oligonema . . . . . *Sereno Watson.* 267
A neglected Spartina . . . . . *Geo. Vasey.* 292
Pentstemon Haydeni, n. sp. . . . . *Sereno Watson.* 311
A remarkable orange tree . . . . . *W. Whitman Bailey.* 311
Helianthus mollis . . . . . *Thomas Meehan.* 312
Further notes on the mutilation of flowers by insects *Jacob Schneck.* 312
A new Ravenelia from Alabama . . . . *Geo. F. Atkinson.* 313
Cleistogamy in Polygonum acre (*illust.*) . *T. H. Kearney, Jr.* 314
Mutilation of the flower of Tecoma radicans . *Jacob Schneck.* 314
Atriplex corrugata, n. sp. . . . . *Sereno Watson.* 345
Sterile flowers of Panicum clandestinum . *Thos. A. Williams.* 346
Peculiar forms of proliferation in timothy (with plate XXVI.) *J. W. Tuomey.* 346
Iris hexagona . . . . . *W. E. Andrews.* 347

EDITORIAL—

Themes for independent investigation, 28.—Misleading analogies, 55.—"What original work shall I do?" 86.—The utilitarian side of botany, 119.—A caution as to nomenclature, 151.—Indiana "reading circle" botany, 180.—The three months' course in botany, 180.—The opportunities of the Botanical Club, A. A. A. S., 209.—Revised terminology, 238.—Nomenclature and authority, 267.—Ignorance of plant physiology, 293.—The division of the section of biology of the A. A. A. S., 315.—Volume XVI. in retrospect, 347.

OPEN LETTERS—

The word "biology"	— —	32
Labeling specimens for the herbarium	*Wm. E. Andrews.*	33
Mounting plants	*W. J. Beal.*	57
Last words on "biology"	— —	89
Pocket edition of Gray's Manual	*Aug. D. Selby.*	90
Mounting plants	*M. S. Bebb.*	121
To phytographers	*P. A. Saccardo.*	153
A plea for better botanical specimens	*L. H. Dewey.*	187
Pachystima Canbyi in cultivation	*Geo. C. Woolson.*	187
The Manchester group of botanists	*J. C. Arthur.*	215
Monomialism	*L. H. Bailey.*	215
The home of Calypso	*F. Blanchard.*	241
What name shall be used? What is authority?	*Conway MacMillan.*	272
Where is the home of Calypso?	*Chas. V. Piper.*	296
Botanical clubs in California	*Willis L. Jepson.*	296
Nomenclature from the practical standpoint	*E. L. Rand.*	318

CURRENT LITERATURE—(about 70 works reviewed).

NOTES AND NEWS—(nearly 200 items).

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12455 var. tenerus, Vasey.
12456 Virginicus, Kunth.
12457 Wolfii, Vasey.
12458 Wrightii, Munro.

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12460 Andersoni, Vasey.

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12486 Arkansana, Benth.

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12487 polymorphus, Hack., var. Montufari, Hack.

TRAGUS 8020
12488 *racemosus, Hall.*

TRICHLORIS 8104
12489 pluriflora, Fourn.
12490 verticillata, Fourn.

TRIODIA 8207
12491 acuminata, Vasey.
12492 albescens, Munro.
12493 ambigua, Vasey.
12494 Americana, (Beauv.)
12495 avenacea, HBK.
12496 Buckleyana, Vasey.
12497 cuprea, Jacq.
12498 eragrostoides, V. & S.
12499 grandiflora, Vasey.
12500 mutica, Scrib.
12501 Nealleyi, Vasey.
12502 pulchella, HBK.
12503 var. parviflora, Vasey.
12504 purpurea, Hack.